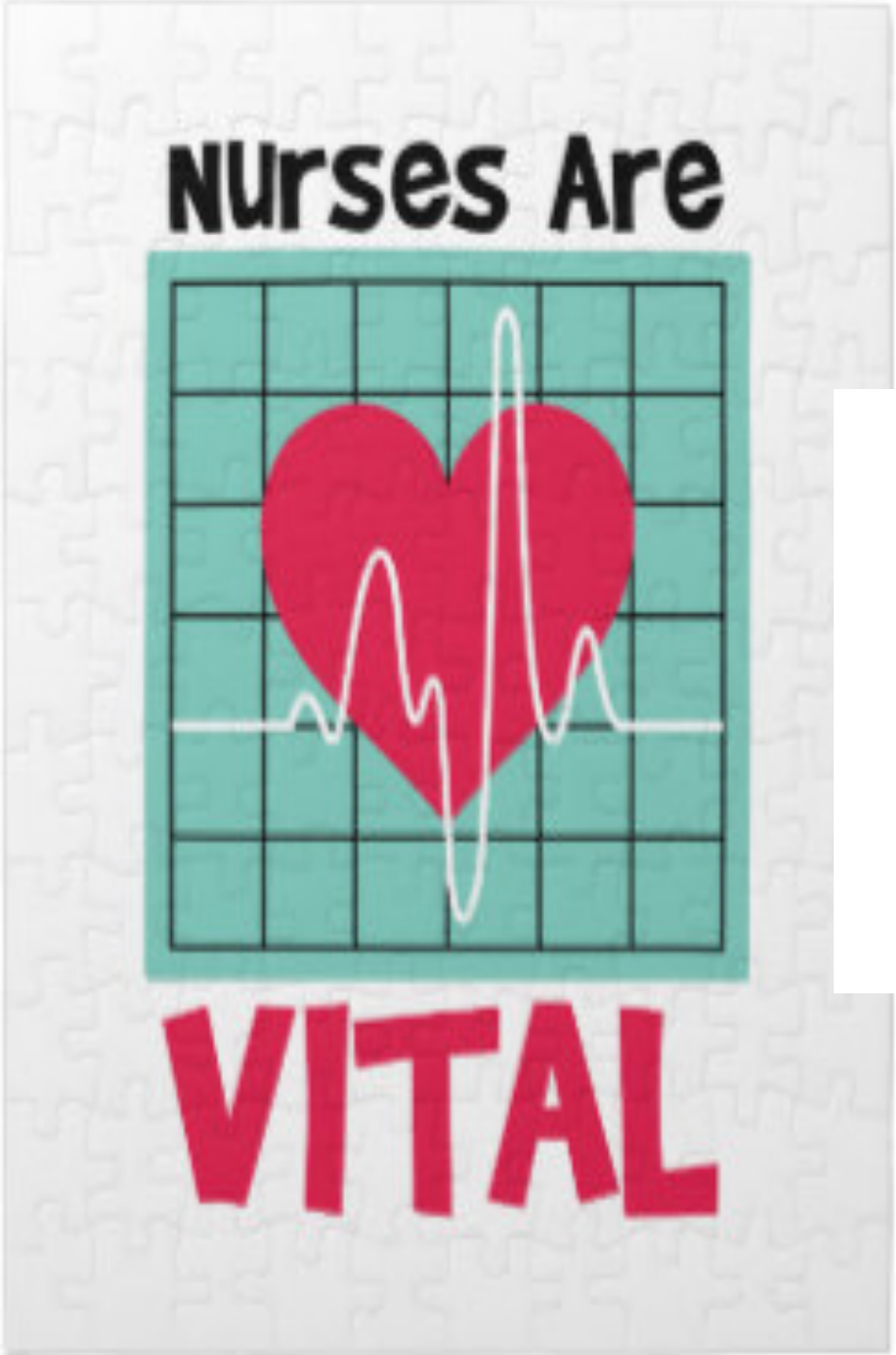

مركز الأمير سلطان لطب وجراحة القلب بالقصيم
Prince Sultan Cardiac Center-Qassim

Basic ECG Interpretation for Nurses

Ms. Cindy Vargas

CVND/CCND Coordinator

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BCH

Objectives:

At the end of the lecture, the participant will be able to:

1. Describe electrical conduction system of the heart.
2. Describe steps in reading basic single strip ECG.
3. Describe normal parameters/measurements of ECG.
4. Identify sinus arrhythmia and junctional arrhythmia.
5. Integrate priority nursing actions in relation to arrhtyhmias.

Pacemakers of the Heart

Pacemakers are excitable myocardial cells where impulse is originating.

1. **Sino-Atrial Node** - **Primary** pacemaker with an intrinsic rate of 60 - 100 beats/ minute.
2. **Atrio-Ventricular Node** - **Back-up** pacemaker with an intrinsic rate of 40 - 60 beats/minute.
3. **Ventricular cells** - **Back-up** pacemaker with an intrinsic rate of 20 - 45 bpm.

Sinoatrial node

↓

AV node

↓

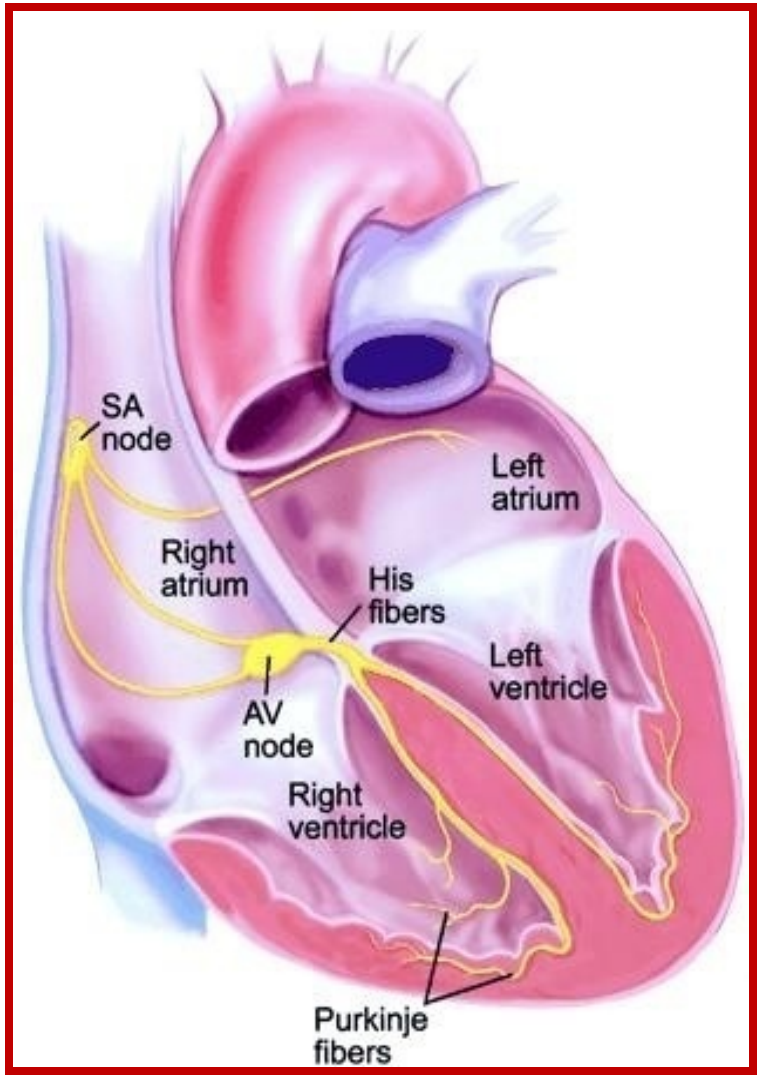
Bundle of His

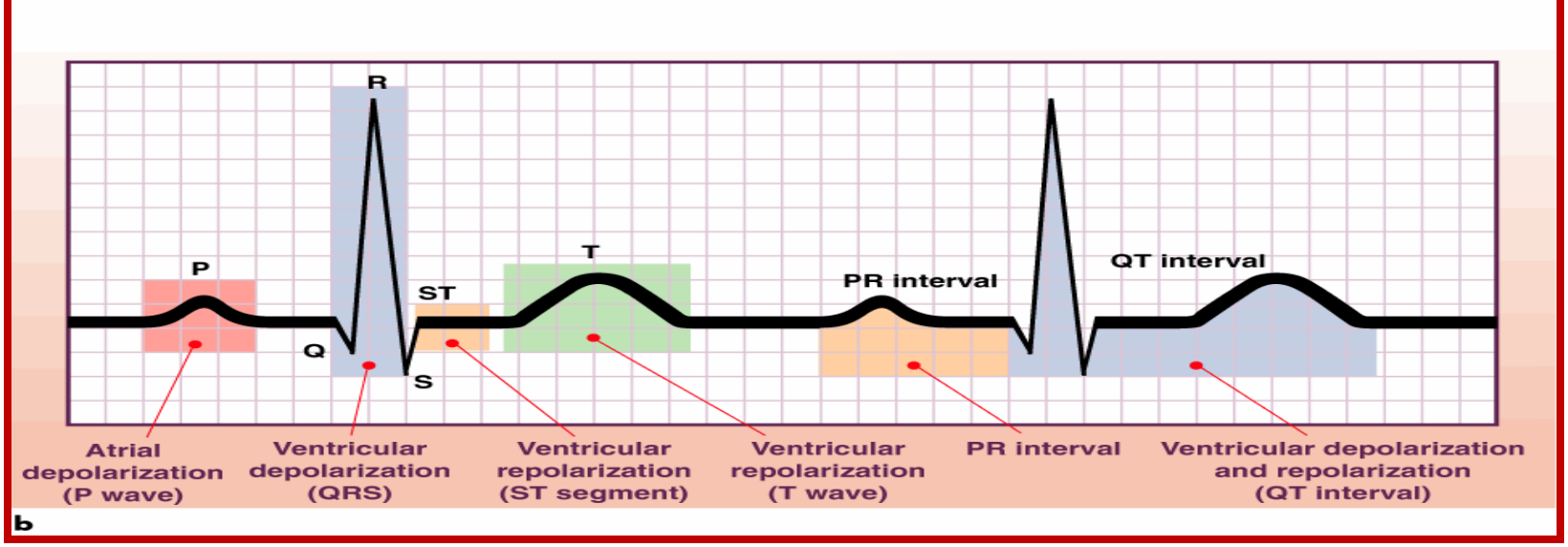
↓

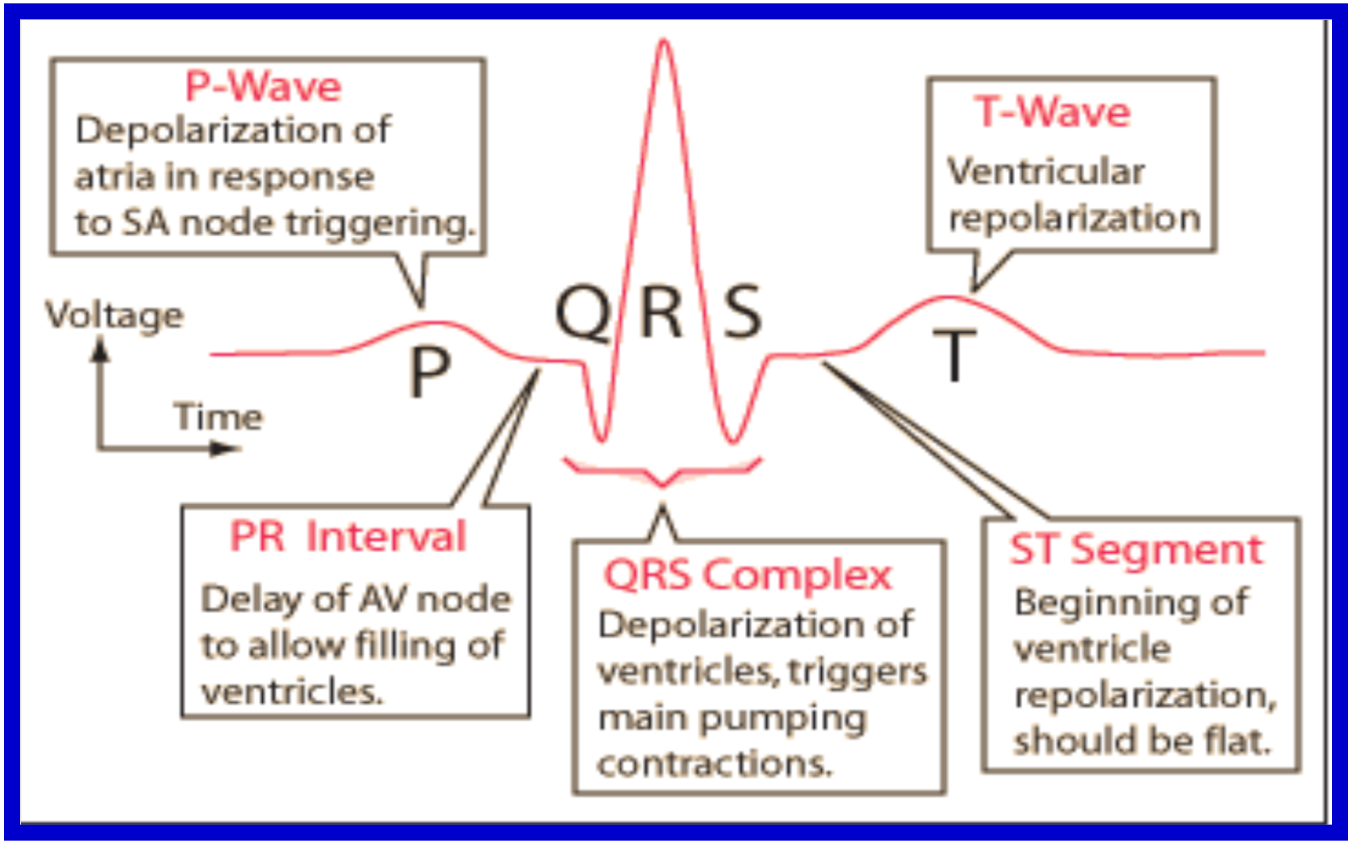
Bundle Branches

↓

Purkinje fibers

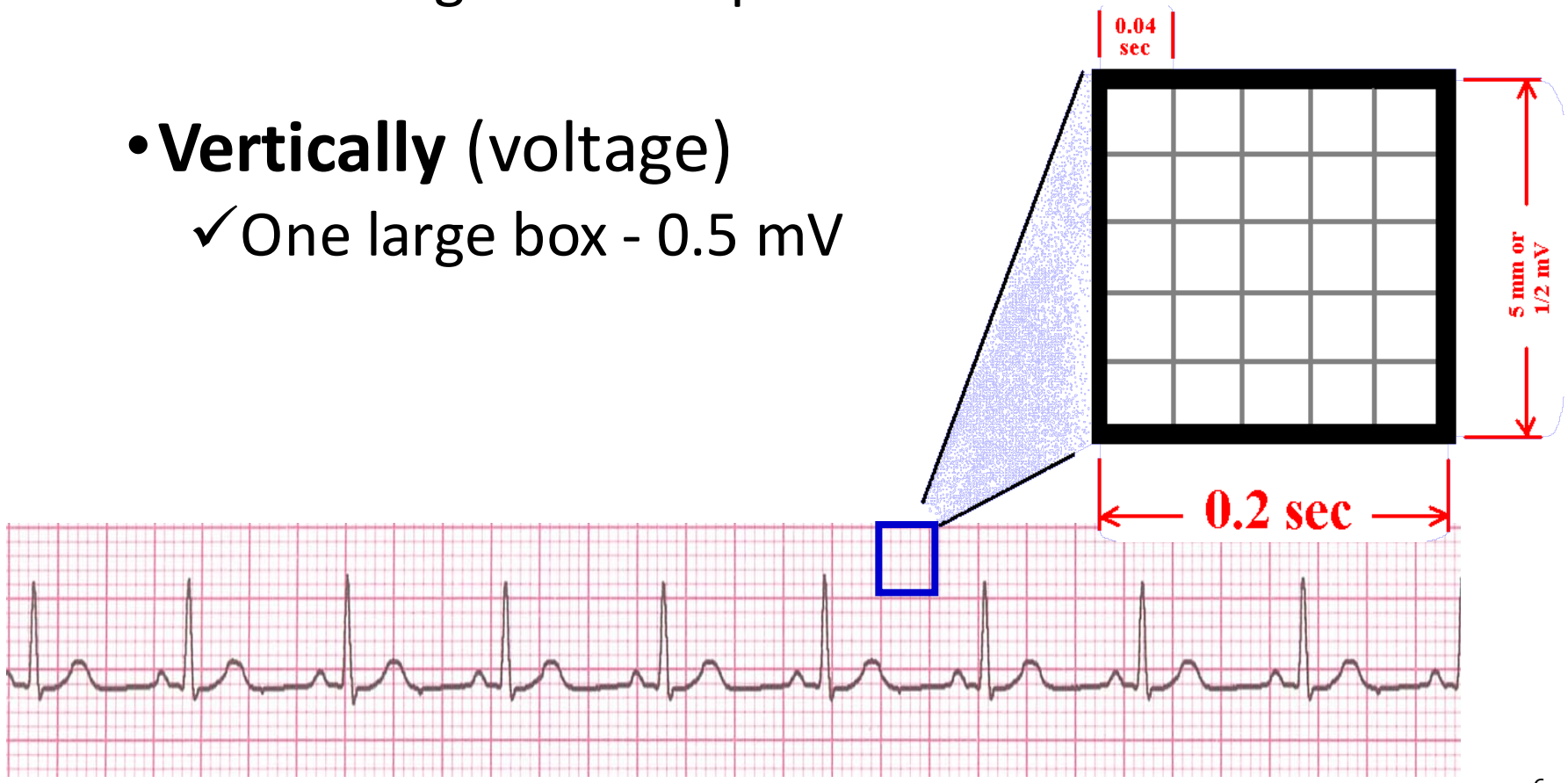



R
P
T
ST
PR interval
QT interval
Q
S
Atrial depolarization (P wave)
Ventricular depolarization (QRS)
Ventricular repolarization (ST segment)
Ventricular repolarization (T wave)
PR interval
Ventricular depolarization and repolarization (QT interval)
b

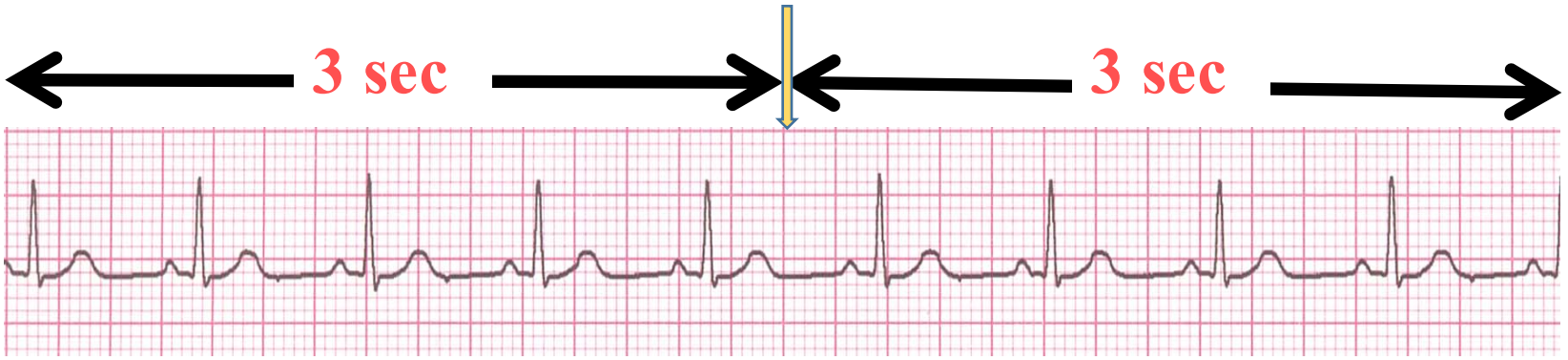

P-Wave
Depolarization of atria in response to SA node triggering.
T-Wave
Ventricular repolarization
Voltage
Time
Q R S
P
T
PR Interval
Delay of AV node to allow filling of ventricles.
QRS Complex
Depolarization of ventricles, triggers main pumping contractions.
ST Segment
Beginning of ventricle repolarization, should be flat.

The ECG Paper

- **Horizontally** (time or speed)
  - ✓One small box is equal to 0.04 sec
  - ✓One large box is equal to 0.20 sec
- **Vertically** (voltage)
  - ✓One large box - 0.5 mV



The ECG Paper (cont)



- Every 3 seconds (15 large boxes) is marked by a vertical line (30 large boxes is equal to 6 seconds strip)
- This helps when calculating the heart rate.

How to Analyze a Rhythm

Basic Steps for Rhythm Analysis

Step 1: Determine **regularity.**

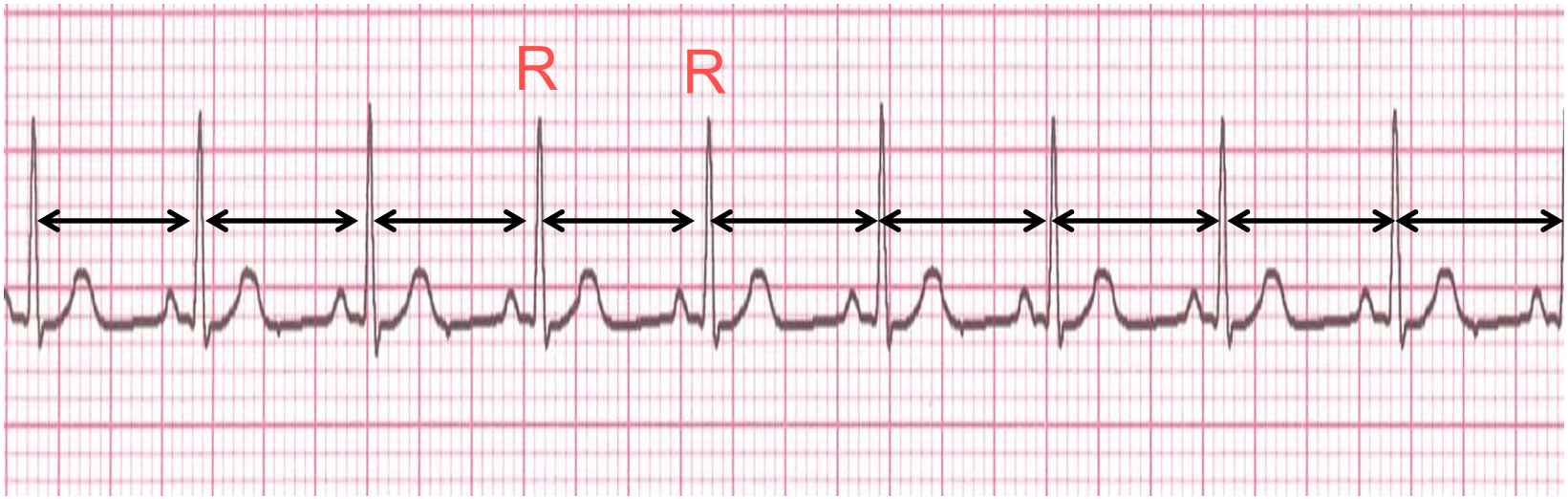
Step 2: Calculate **rate.**

Step 3: Assess the **P waves.**

Step 4: Determine **PR interval.**

Step 5: Determine **QRS duration**.

Step 1: Determine regularity

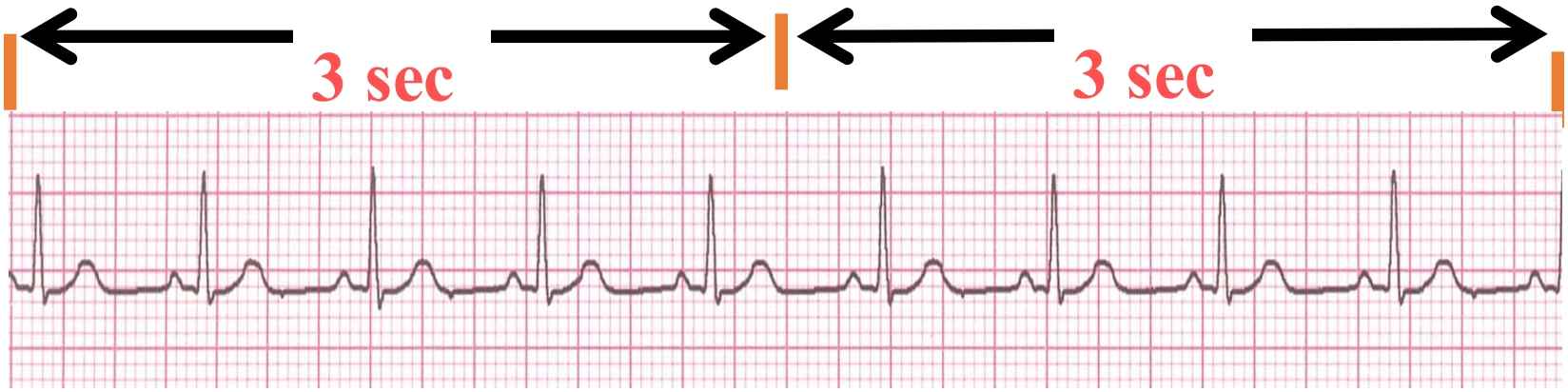


✓Look at the R-R distances (using a caliper or markings on a pen or paper).

✓Is it regular (are they equidistant apart)? Occasionally irregular? Regularly irregular? Irregularly irregular?

Interpretation? *Regular*

Step 2: Calculate Rate (option A)



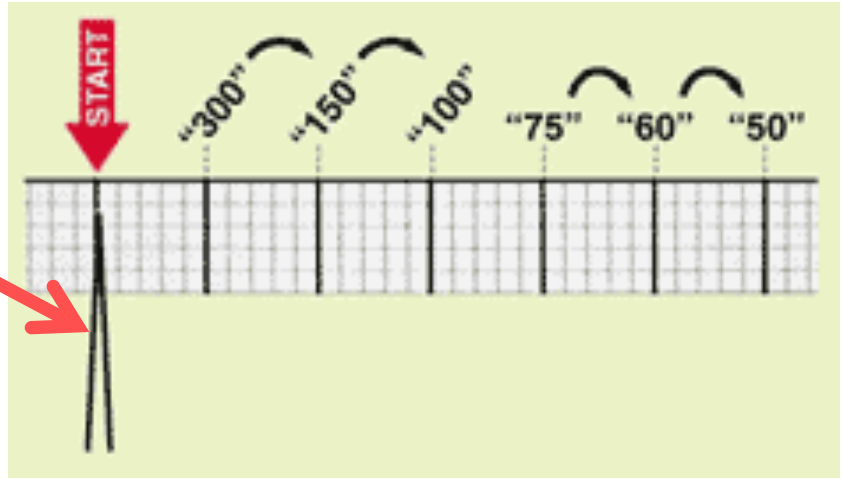
Option A

Count how many R waves in a 6 second rhythm strip, then multiply by 10.

9 x 10 = 90 bpm

Step 2: Calculate Rate (option B)

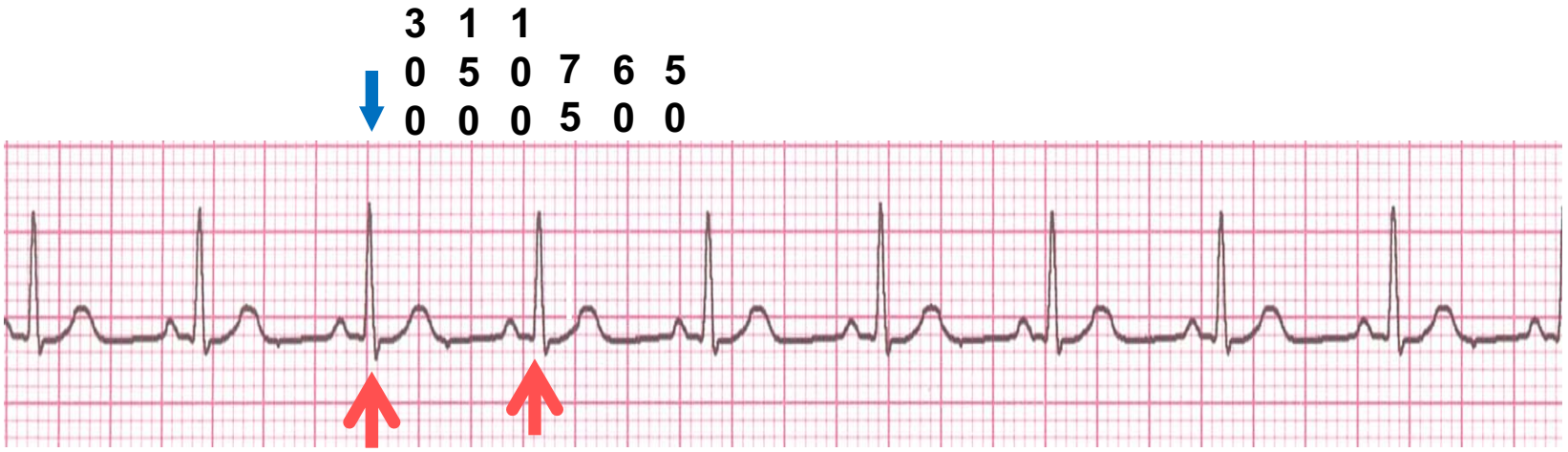
R wave



Option B

1. Find a R wave that lands on a bold line.
2. Count the number of large boxes to the next R wave. If the second R wave is 1 large box away the rate is 300, 2 boxes - 150, 3 boxes - 100, 4 boxes-75.

Option B (continuation)



2. Memorize the sequence:

300 - 150 - 100 - 75 - 60 - 50

Approx. 1 box less than 100 = 95 bpm

Step 3: Assess the P waves

- ✓Are there P waves?
- ✓Do the P waves all look the same? upright?
- ✓Do the P waves occur at a regular rate?
- ✓Is there one P wave before each QRS?

Normal P waves with 1 P wave for every QRS

Step 4: Determine PR interval

Normal: 0.12 - 0.20 seconds

3 - 5 small boxes

Interpretation?

0.12 seconds

Step 5: Determine QRS duration

Normal: 0.04 - 0.12 seconds.

(1 - 3 boxes)

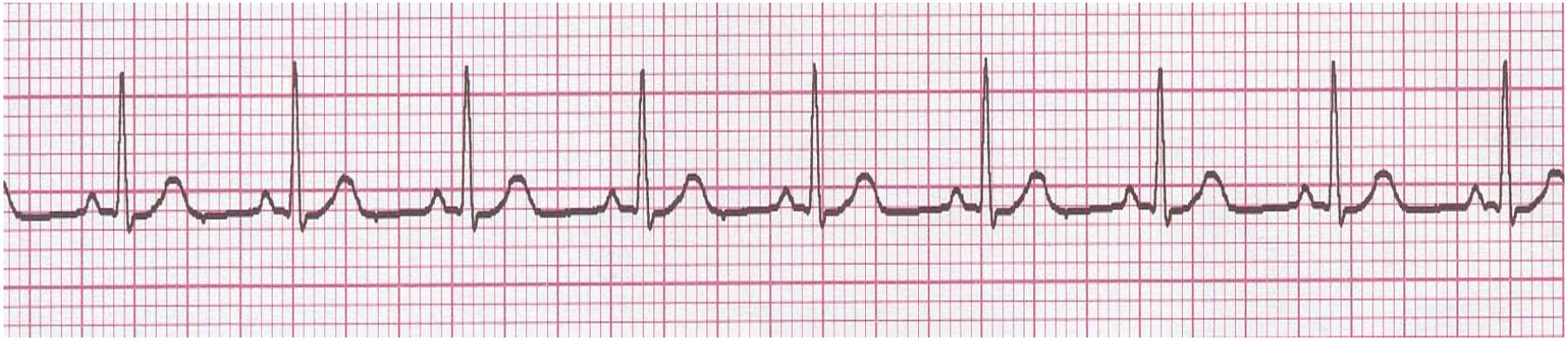
Interpretation?

0.08 seconds

Rhythm Summary

• Rate	90-95 bpm
• Regularity	regular
• P waves	normal
• PR interval	0.12 s
• QRS duration	0.08 s
Interpretation?	*Normal Sinus Rhythm*

Normal Sinus Rhythm Parameters



- Rate 60 - 100 bpm
- Regularity regular
- P waves normal, followed by QRS
- PR interval 0.12 - 0.20 s
- QRS duration 0.04 - 0.12 s

Sinus Rhythms

- ✓Normal Sinus Rhythm
- ✓Sinus Bradycardia
- ✓Sinus Tachycardia

Rhythm Strip #1

- Rate? 30 bpm
- Regularity? regular
- P waves? normal
- PR interval? 0.12 s
- QRS duration? 0.10 s

Interpretation? *Sinus Bradycardia*

Sinus Bradycardia

Abnormal Rate: **less** 60 bpm

Rhythm Strip 2

- Rate? 130 bpm
- Regularity? regular
- P waves? normal
- PR interval? 0.16 s
- QRS duration? 0.08 s

Interpretation? *Sinus Tachycardia*

Sinus Tachycardia

Rate > 100 bpm

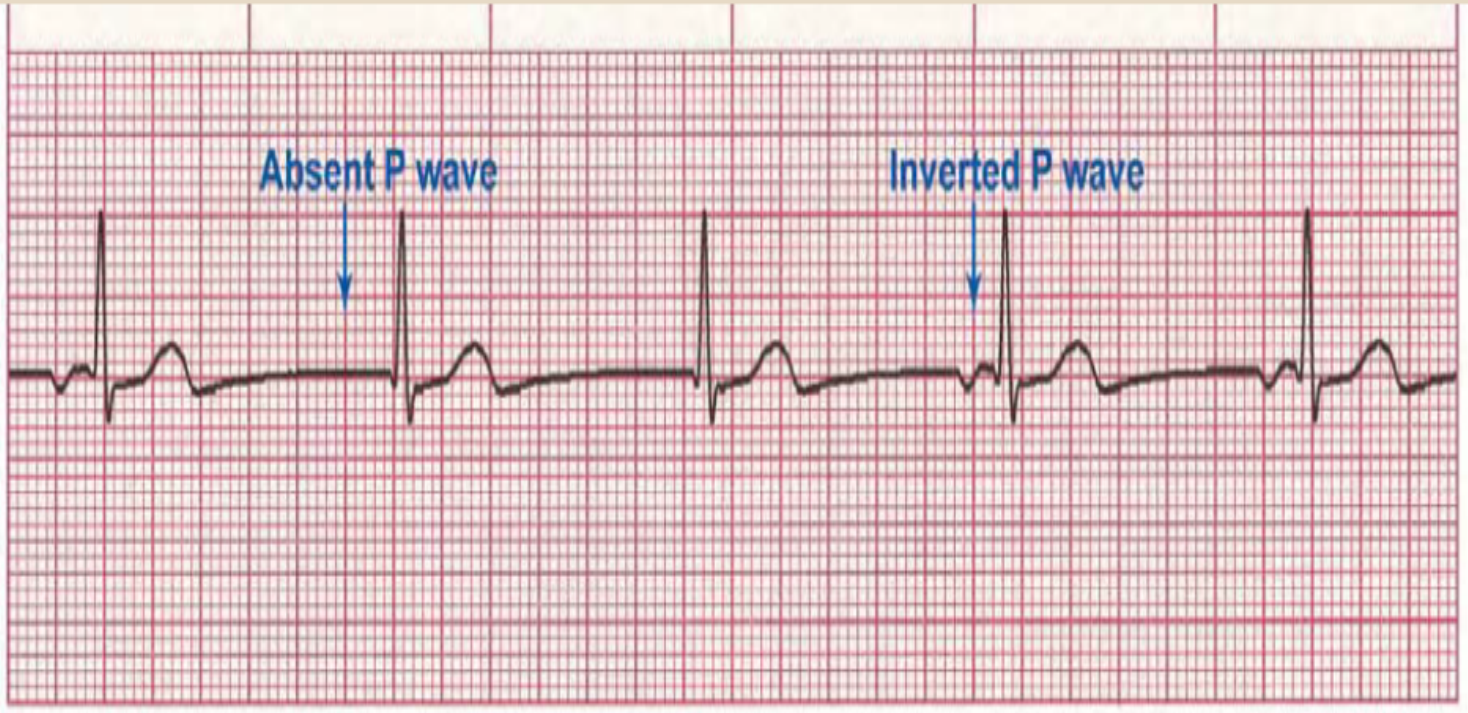
Practice makes perfect

END

Junctional arrhythmias

- Junctional rhythm
- Accelerated Junctional Rhythm
- Junctional Tachycardia

JUNCTIONAL RHYTHM



Rate: 40–60 bpm

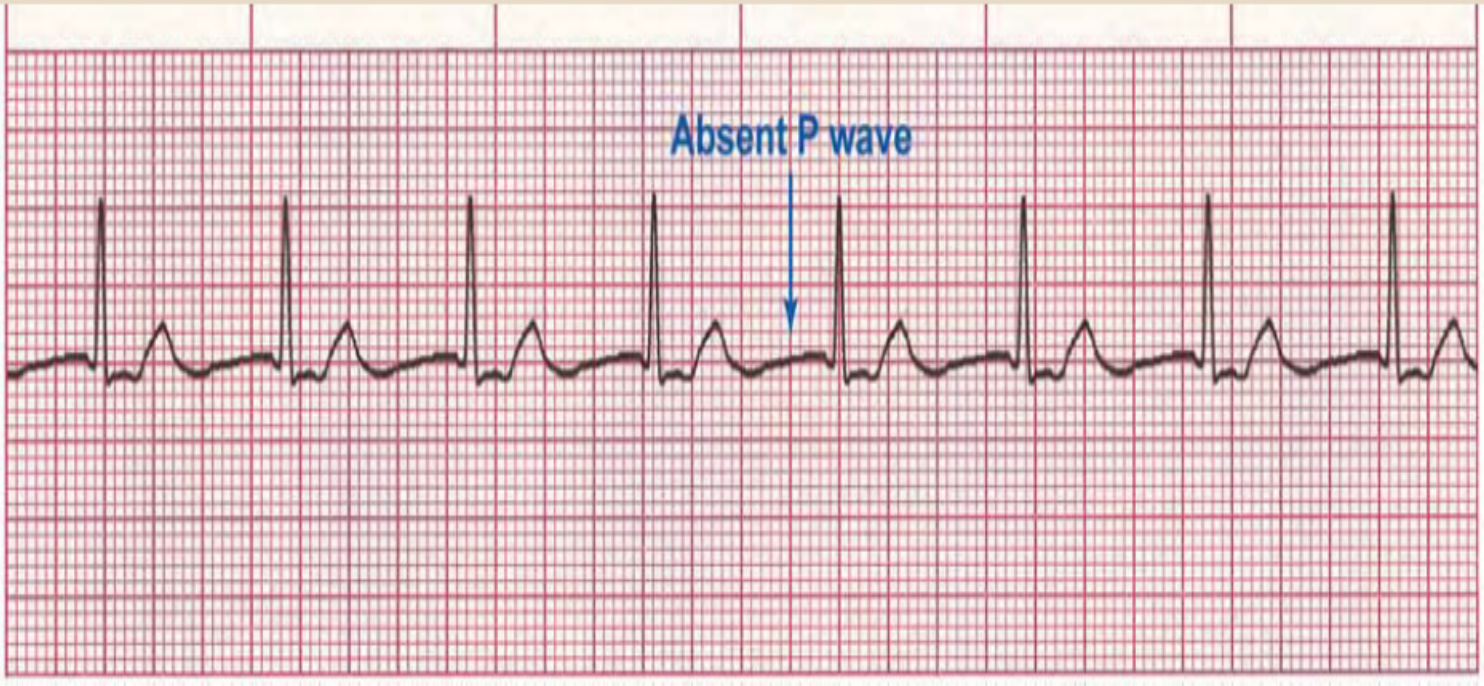
Rhythm: Regular

P Waves: Absent, inverted, buried, or retrograde

PR Interval: None, short, or retrograde

QRS: Normal (0.06–0.10 sec)

ACCELERATED JUNCTIONAL RHYTHM



Rate: 61 to 100bpm

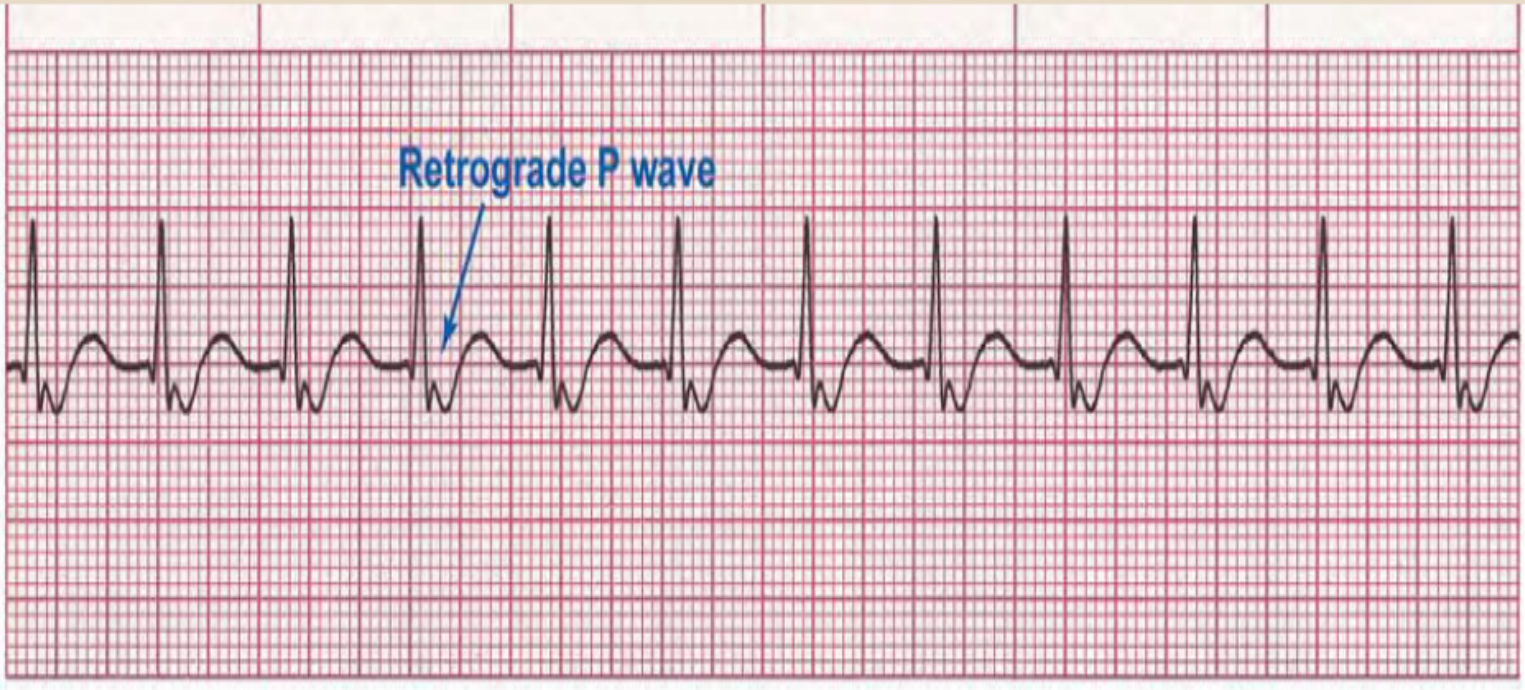
Rhythm: Regular

P Waves: Absent, inverted, buried, or retrograde

PR Interval: None, short, or retrograde

QRS: Normal (0.06–0.10 sec)

JUNCTIONAL TACHYCARDIA



Rate: 101 to 180bpm

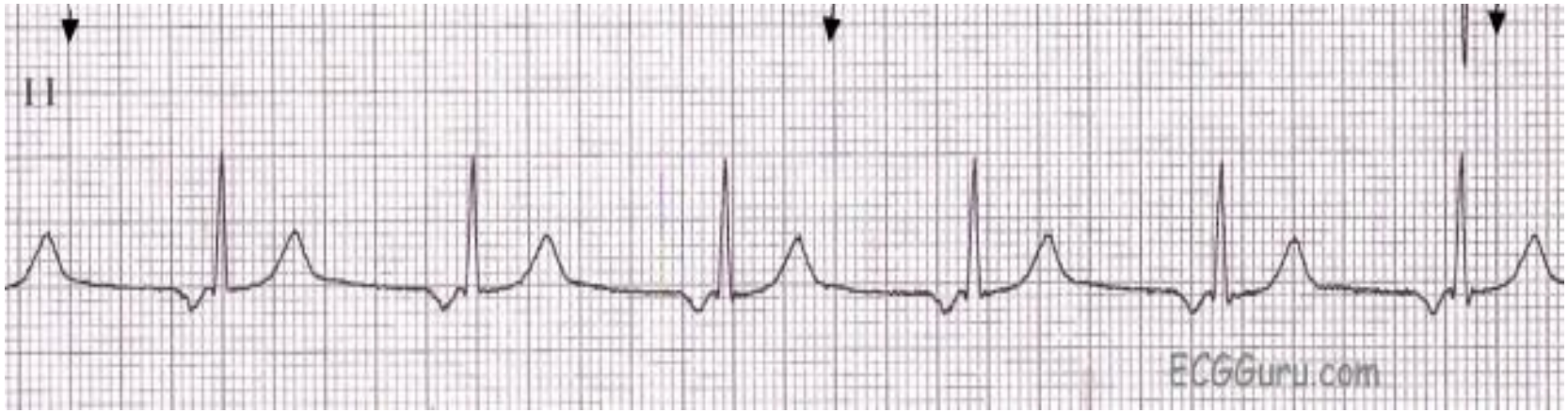
Rhythm: Regular

P Waves: Absent, inverted, buried, or retrograde

PR Interval: None, short, or retrograde

QRS: Normal (0.06–0.10 sec)

Practice makes perfect



In Summary Junctional Arrhythmia:

1. Rate 40 bpm to 180 bpm
2. **Absent, retrograde, buried P waves**
3. Regular rhythm
4. **Shortened** or normal PR interval
5. Normal QRS

REFERENCES:

1. Retrieved from: www.practicalclinicalskills.com/**ecg-interpretation**.aspx
2. **AACN: Essentials of Critical Care Nursing by Suzanne Burns**

THANK YOU ☺